CLAIMS

1. A method for identifying the sequence of a target polynucleotide, comprising:

(i) contacting the target polynucleotide with a polymerase enzyme and one of the nucleotides A, T (U), G and C under conditions suitable for the polymerase reaction to proceed;

(ii) measuring the time taken for the polymerase to bind to and subsequently dissociate from the target polynucleotide, to thereby determine whether the polymerase has incorporated the nucleotide onto the target polynucleotide;

(iii) optionally repeating steps (i) and (ii) with additional nucleotides, to thereby identify the sequence of the target polynucleotide.

2. A method for the identification of a mutation in a target polynucleotide, comprising the steps:

(i) contacting the target polynucleotide with a polymerase enzyme and one of the nucleotides A, T (U), G and C under conditions suitable for the polymerase reaction to proceed;

(ii) measuring the time taken for the polymerase to bind to and subsequently dissociate from the target polynucleotide, to thereby identify whether the polymerase has incorporated the nucleotide onto the target polynucleotide, and with reference to the native sequence of the target, determine whether a mutation exists.

3. A method according to claim 1 or claim 2, wherein steps (i) - (ii) are carried out with each of the different nucleotides in turn, until incorporation is detected.

4. A method according to any preceding claim, wherein the target polynucleotide is immobilised on a support material.

5. A method according to any preceding claim, wherein a plurality of target polynucleotides are immobilised on a support material.

6. A method according to any preceding claim, wherein step (ii) is carried out by measuring applied radiation.

7. A method according to any preceding claim, wherein step (ii) is carried out by measuring raman scattering.

8. A method according to any of claims 1 to 6, wherein step (ii) is carried out by applying a surface electromagnetic wave.

9. A method according to any claim 8, wherein the surface electromagnetic wave is a surface plasmon wave.

10. A method according to any of claims 1 to 8, wherein detection is carried out by measurement of a surface electromagnetic wave.

11. A method according to any preceding claim, wherein the polymerase comprises a detectable label attached thereto.

12. A method according to claim 11, wherein the label is a fluorophore.

13. A method according to claim 11 when pendent on any of claims 1 to 6, wherein the polymerase further comprises an energy donor label or an energy acceptor label, and wherein step (ii) is carried out by measuring energy transfer between the fluorophore and the energy donor or acceptor.